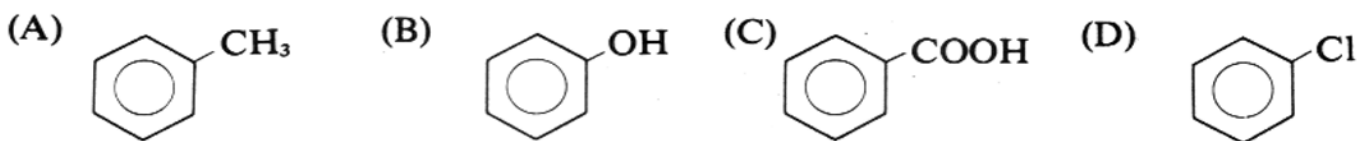


# Self Test 9

## Organic Chemistry

Select the best answer and write its letter in the space at the right.

1. Which compound is a hydrocarbon?



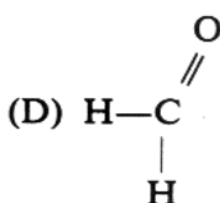
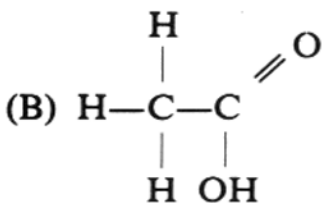
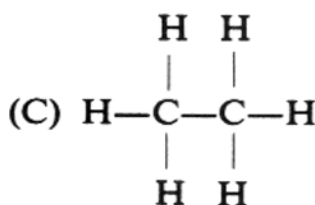
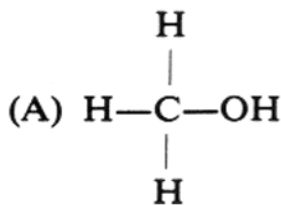
1. A

2. A molecule of which alcohol contains more than one hydroxyl group?

(A) propanol (B) butanol (C) pentanol (D) glycerol

2. D

3. Which is an example of an organic acid?



3. B

4. What could be the name of a compound that has the general formula  $\text{R}-\text{OH}$ ?

(A) methanol (C) methyl methanoate  
(B) methane (D) methanoic acid

4. A

5. An organic compound with the formula  $\text{C}_3\text{H}_7\text{OH}$  should be classified as

(A) a base (B) an acid (C) an alcohol (D) an aldehyde

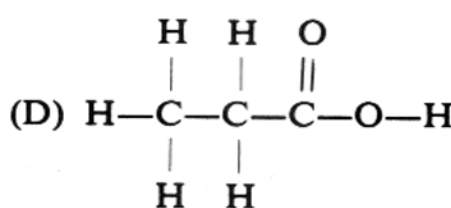
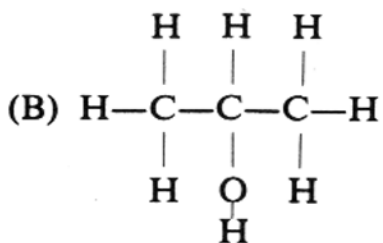
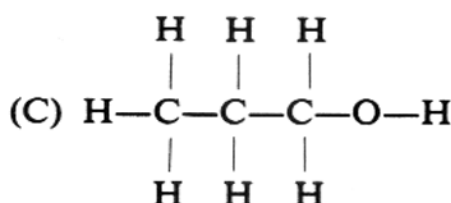
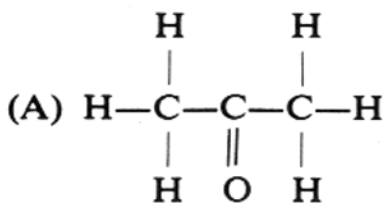
5. C

6. An organic compound whose water solution turns litmus red is

(A)  $\text{CH}_3\text{OH}$  (C)  $\text{CH}_3\text{COOH}$   
(B)  $\text{C}_6\text{H}_{12}$  (D)  $\text{C}_6\text{H}_{12}\text{O}_6$

6. C

7. Which structural formula represents a primary alcohol?



7. C

8. Which formula represents an organic acid?

- (A)  $\text{CH}_3\text{COOH}$  (C)  $\text{CH}_3\text{OCH}_3$   
(B)  $\text{CH}_3\text{OH}$  (D)  $\text{CH}_3\text{COOCH}_3$

8. A

9. A solution of methanol differs from a solution of acetic acid in that the solution of acetic acid

- (A) contains molecules only (C) turns red litmus to blue  
(B) has a pH of 7 (D) conducts electricity

9. D

10. Which compound is an ester?

- (A)  $\text{CH}_3\text{COOH}$  (C)  $\text{CH}_3\text{COOCH}_3$   
(B)  $\text{CH}_3\text{CHO}$  (D)  $\text{CH}_3\text{COCH}_3$

10. C

11. Which is the correct electron-dot diagram for ethene,  $\text{C}_2\text{H}_4$ ?

- (A)  $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} :: \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$  (C)  $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} \cdot \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$   
(B)  $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} :: \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$  (D)  $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} : \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$

11. A

12. If a compound has a molecular formula of  $\text{CH}_2\text{O}_2$ , then its structural formula must be

- (A)  $\begin{array}{c} \text{H} \\ | \\ \text{O} - \text{C} - \text{O} \\ | \\ \text{H} \end{array}$  (C)  $\begin{array}{c} \text{H} \\ | \\ \text{H} - \text{C} - \text{O} \\ | \\ \text{O} \end{array}$   
(B)  $\begin{array}{c} \text{O} - \text{H} \\ / \\ \text{C} \\ \backslash \\ \text{O} - \text{H} \end{array}$  (D)  $\begin{array}{c} \text{O} \\ || \\ \text{H} - \text{C} \\ | \\ \text{O} - \text{H} \end{array}$

12. D

13. What is the total number of OH groups in a molecule of glycerol?

- (A) 1 (B) 2 (C) 3 (D) 4

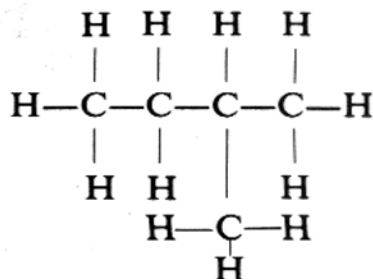
13. C

14. The formula of methanoic acid is

- (A)  $\text{HCHO}$  (C)  $\text{CH}_3\text{OH}$   
(B)  $\text{HCOOH}$  (D)  $\text{HCOOCH}_3$

14. B

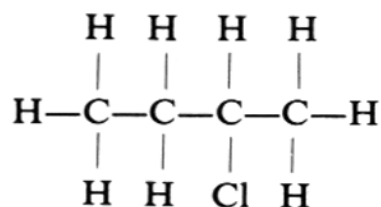
15. What is the correct IUPAC name of the compound represented by the following structural formula?



- (A) *n*-pentane (C) methylbutane  
(B) isobutane (D) *n*-butane

15. C

16. What is the name of the compound below?



- (A) 1-chlorobutane (C) 3-chlorobutane  
(B) 2-chlorobutane (D) 4-chlorobutane

16. B

17. The general formula for the alkyne series is

- (A)  $C_nH_n$  (B)  $C_nH_{n-2}$  (C)  $C_nH_{2n}$  (D)  $C_nH_{2n-2}$

17. D

18. Which compound represents a member of the benzene series?

- (A) acetylene (B) ethylene (C) toluene (D) propene

18. C

19. A toluene molecule differs from a benzene molecule in that the toluene molecule contains one additional carbon atom and

- (A) one additional hydrogen atom  
(B) two additional hydrogen atoms  
(C) three additional hydrogen atoms  
(D) four additional hydrogen atoms

19. B

20. Which is the first member of the alkyne series?

- (A)  $CH_2$  (B)  $CH_4$  (C)  $C_2H_2$  (D)  $C_2H_4$

20. C

21. Double or triple covalent bonds are associated with compounds in the

- (A) alkane and alkene series (C) alkane and benzene series  
(B) alkyne and alkane series (D) alkene and alkyne series

21. D

22. Each member of the alkane series differs from the preceding member by one additional carbon atom and

- (A) 1 hydrogen atom (C) 3 hydrogen atoms  
(B) 2 hydrogen atoms (D) 4 hydrogen atoms

22. B

23. Which formula represents a member of the same homologous series as  $C_8H_{14}$ ?

- (A)  $C_3H_4$  (B)  $C_3H_5$  (C)  $C_3H_6$  (D)  $C_3H_8$

23. A

24. Which is the general formula of the homologous series that contains the compound  $CH_3CH_2CH_2CH_2CH=CH_2$ ?

- (A)  $C_nH_{2n+2}$  (C)  $C_nH_{2n-2}$   
(B)  $C_nH_{2n}$  (D)  $C_nH_{2n-6}$

24. B

25. Which formula represents a member of the alkene series?

- (A)  $C_3H_6$  (B)  $C_2H_6$  (C)  $C_2H_2$  (D)  $C_6H_6$

25. A

26. Which is the third member of the alkene series?

- (A) propane (B) propene (C) butane (D) butene

26. D

27. What is the total number of covalent bonds in a molecule of ethane?

- (A) 6 (B) 2 (C) 7 (D) 4

27. C

28. As the molecular mass of the compounds of the alkane series increases, their boiling point

- (A) decreases (B) increases (C) remains the same

28. B

29. Which compound contains a triple bond?

- (A) methyl chloride (B) ethane (C) methanol (D) ethyne

29. D

30. Which type of bonding generally characterizes organic compounds?

- (A) covalent (B) ionic (C) hydrogen (D) metallic

30. A

31. An organic compound would most likely have

- (A) an ionic crystalline structure
- (B) high electrical conductivity in solution
- (C) a low melting point
- (D) a tendency to react rapidly

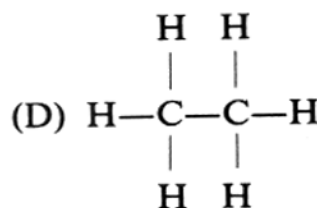
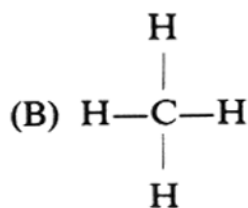
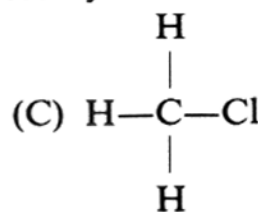
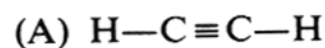
31. C

32. Which formula represents a saturated hydrocarbon?

- (A)  $C_2H_2$  (B)  $C_2H_4$  (C)  $C_3H_6$  (D)  $C_3H_8$

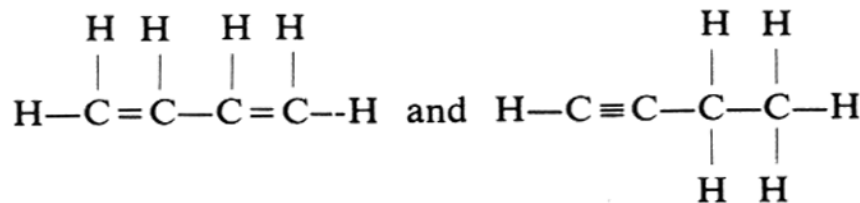
32. D

33. Which formula represents an unsaturated hydrocarbon?



33. A

34. The structural formulas



represent molecules that are both

- (A) halogen addition products
- (B) unsaturated hydrocarbons
- (C) members of the alkynes
- (D) isomers of butane

34. B

35. Which formula represents an unsaturated hydrocarbon?

- (A)  $C_3H_8$  (B)  $C_3H_7Cl$  (C)  $C_3H_6$  (D)  $CCl_4$

35. C

36. Molecules of 1-propanol and 2-propanol have different

- (A) percentage compositions
- (B) molecular masses
- (C) molecular formulas
- (D) structural formulas

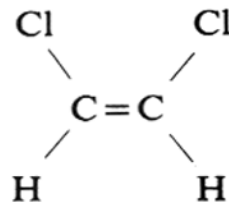
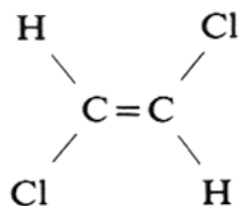
36. D

37. Which compound is an isomer of  $CH_3COOH$ ?

- (A)  $HCOOCH_3$  (B)  $CH_3CH_2OH$  (C)  $CH_3CH_2COOH$  (D)  $CH_3COOCH_3$

37. A

38. What term is used to describe the relationship between these two forms of dichloroethene?



- (A) isotopes (B) isomers (C) isotones (D) allotropes

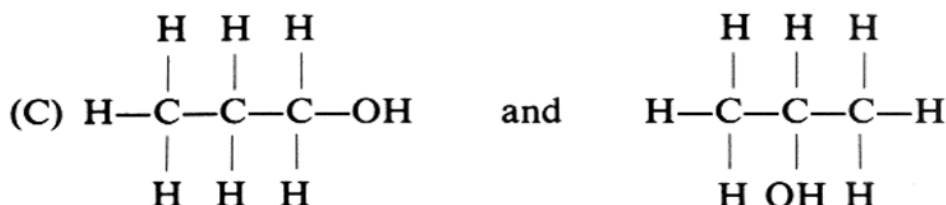
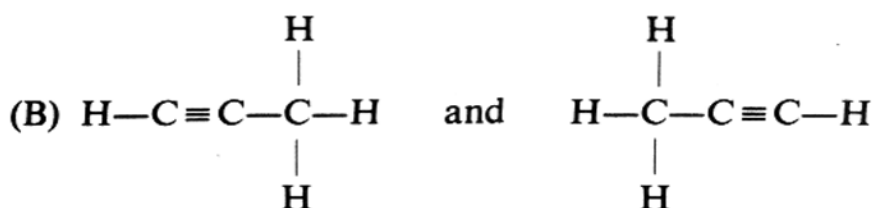
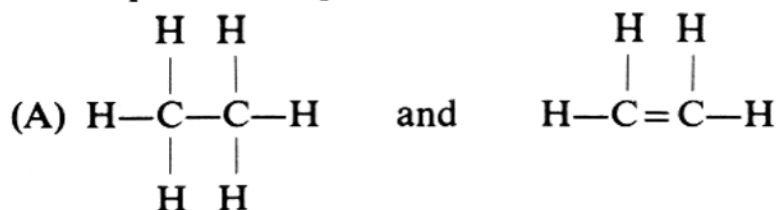
38. B

39. Which is an isomer of 2-chloropropane?

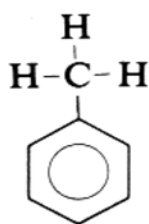
- (A) butane (B) propane (C) 1-chlorobutane (D) 1-chloropropane

39. D

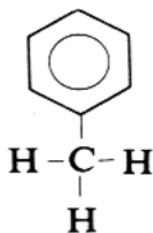
40. Which pair of compounds illustrates isomerism?



(D)



and



40. C

41. The isomers of propanol differ in

- (A) the number of carbon atoms  
(B) molecular mass  
(C) the arrangement of the carbon atoms

41. C

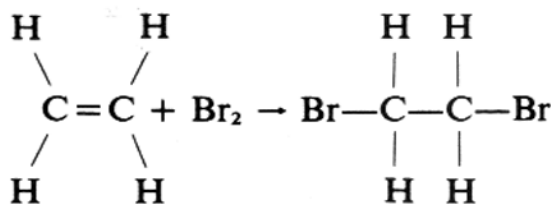
42. Which compound will react with  $\text{CH}_3\text{COOH}$  to form the ester methyl ethanoate?

- (A)  $\text{CH}_3\text{OCH}_3$  (C)  $\text{CH}_3\text{OH}$   
(B)  $\text{CH}_3\text{COCH}_3$  (D)  $\text{CH}_3\text{COOH}$

42. C

43. The reaction in the equation below is an example of

- (A) substitution (C) polymerization  
(B) hydrogenation (D) addition



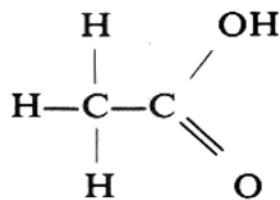
43. D

44. Which reaction produces ethyl alcohol as one of the principal products?

- (A) an esterification reaction (C) a saponification reaction  
(B) a neutralization reaction (D) a fermentation reaction

44. D

45. Which equation does *not* represent a substitution reaction?  
 (A)  $\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$   
 (B)  $\text{CH}_2\text{Cl}_2 + \text{Cl}_2 \rightarrow \text{CHCl}_3 + \text{HCl}$   
 (C)  $\text{C}_2\text{H}_4 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_4\text{Cl}_2$   
 (D)  $\text{CCl}_4 + 2\text{HF} \rightarrow \text{CCl}_2\text{F}_2 + 2\text{HCl}$
46. A mixture of ethanoic (acetic) acid and ethanol (ethyl alcohol) is heated in the presence of concentrated sulfuric acid. The organic product formed is  
 (A)  $\text{CH}_3\text{COOC}_2\text{H}_5$  (C)  $\text{CH}_3\text{COC}_2\text{H}_5$   
 (B)  $\text{CH}_3\text{COC}_2\text{H}_5\text{OH}$  (D)  $\text{C}_2\text{H}_5\text{CH}_3\text{COOH}$
47. Which equation represents an esterification reaction?  
 (A)  $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$   
 (B)  $\text{C}_5\text{H}_{10} + \text{H}_2 \rightarrow \text{C}_5\text{H}_{12}$   
 (C)  $\text{C}_3\text{H}_8 + \text{Cl}_2 \rightarrow \text{C}_3\text{H}_7\text{Cl} + \text{HCl}$   
 (D)  $\text{HCOOH} + \text{CH}_3\text{OH} \rightarrow \text{HCOOCH}_3 + \text{HOH}$
48. Which compound reacts with ethanol,  $\text{C}_2\text{H}_5\text{OH}$ , and produces the ester ethyl acetate,  $\text{CH}_3\text{COOC}_2\text{H}_5$ ?  
 (A)  $\text{CH}_3\text{COOH}$  (C)  $\text{CH}_3\text{OCH}_3$   
 (B)  $\text{CH}_3\text{CHO}$  (D)  $\text{CH}_3\text{CH}_2\text{Cl}$
49. A reaction between an acid and alcohol produces an ester and  
 (A) carbon dioxide (C) glycerol  
 (B) water (D) ethanol
50. The complete combustion of ethane,  $\text{C}_2\text{H}_6$ , produces  
 (A)  $\text{C}_2\text{H}_5\text{OH}$  (C)  $\text{CO}_2$  and  $\text{H}_2$   
 (B)  $\text{CH}_3\text{COOH}$  (D)  $\text{CO}_2$  and  $\text{H}_2\text{O}$
51. By which process is ethanol,  $\text{CH}_3\text{CH}_2\text{OH}$ , converted to acetic acid,  $\text{CH}_3\text{COOH}$ ?  
 (A) neutralization (C) oxidation  
 (B) polymerization (D) reduction
52. What is the total number of carbon atoms in a molecule of 2,2-dimethylpropane?  
 (A) 5 (B) 2 (C) 3 (D) 4
53. What is the total number of unshared valence electrons in all atoms of the methanol molecule,  $\text{CH}_3\text{OH}$ ?  
 (A) 2 (B) 4 (C) 14 (D) 18
54. The structural formula of  $\text{CH}_3\text{COOH}$  is shown below.



When  $\text{CH}_3\text{COOH}$  ionizes, which atom is donated to  $\text{H}_2\text{O}$ ?

- (A) H bonded to C (C) O double bonded to C  
 (B) H bonded to O (D) O single bonded to C
55. Which process is used in the petroleum refining process to convert large molecules into smaller molecules?  
 (A) cracking  
 (B) fermentation  
 (C) neutralization  
 (D) hydrogenation

45. C

46. A

47. D

48. A

49. B

50. D

51. C

52. A

53. B

54. B

55. A

56. Which kind of reaction proceeds at the greatest rate?

- (A) esterification
- (B) substitution
- (C) dehydration
- (D) neutralization

56. D

57. Which kind of organic compound is least soluble in water?

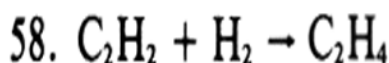
- (A) alcohol (B) aldehyde (C) alkane (D) acid

57. C

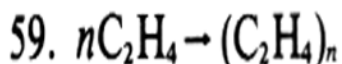
*For each question in 58-60, select from the list the process most clearly associated with the equation and write its letter in the space at the right.*

### Processes

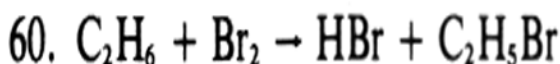
- (A) polymerization
- (B) hydrogenation
- (C) saponification
- (D) substitution



58. B



59. A



60. D